

Type	L #	Hits	Search Text	DBs	Time Stamp
1 BRS	L1	3922	(polyolefin or polyethylene or polypropylene) same (antistatic or (anti adj static))	USPAT	2001/04/26 17:45
2 BRS	L2	1433	(polyester or ester or diester or triester) same 1	USPAT	2001/04/26 17:49
3 BRS	L3	235462	(fiber or filament or fibrous) ti,ab,bsum,clm.	USPAT	2001/04/26 17:27
4 BRS	L4	99	((hydrophobic or (hydro adj phobic)) same 1) ti,ab,bsum,clm.	USPAT	2001/04/26 17:29
5 BRS	L5	54	3 and 4	USPAT	2001/04/26 17:29
6 BRS	L6	44	2 and 5	USPAT	2001/04/26 17:42
7 BRS	L7	54909	(cardable or carding or card or carded) ti,ab,bsum,cl	USPAT	2001/04/26 17:43
8 BRS	L8	6228	3 and 7	USPAT	2001/04/26 17:44
9 BRS	L9	94	1 and 8	USPAT	2001/04/26 17:44
10 BRS	L10	164634	lubricant or lubricate or lubricating or lubricated or antistatic or (anti adj static)	USPAT	2001/04/26 17:46
11 BRS	L11	19225	(polyester or ester or diester or triester) same 10	USPAT	2001/04/26 17:50
12 BRS	L12	67	9 and 11	USPAT	2001/04/26 17:50
13 BRS	L14	397	((tridecyl or isotridecyl or (tri adj decyl)) near2 stearate) or (neopentyl adj glycol adj ester)	USPAT	2001/04/26 18:26
14 BRS	L15	1	9 and 14	USPAT	2001/04/26 18:27

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ethylene oxide with coconut fatty acids to form PEG 400 monolaurate (cococate) (Emerest 2650) and PEG 600 monolaurate (Emerest 2661), and the like. The lubricant component can also be selected from non-water soluble materials such as synthetic hydrocarbon oils, alkyl esters such as tridecyl stearate (Emerest 2308) which is the reaction product of tridecyl alcohol and stearic acid, and polyol esters such as trimethylol propane tripelargonate (Emery 6701) and pentaerythritol tetrapelargonate (Emery 2484).

DEPR:

Antistats function by either reducing the charge generation or by increasing the rate of charge dissipation. Most antistats operate by increasing the rate of dissipation and rely on atmospheric moisture for their effectiveness. A hydrophobic fiber such as polypropylene depends on an antistat coating to impart high surface conductivity for charge dissipation. There are several ways to assess the antistatic activity of a finish composition. During the measurement of fiber to metal friction and the passage of yarn around the metal pin, static charges are generated. The Rothschild friction meter has an electrostatic voltmeter attachment which measures the charge generated by the moving yarn. At periodic intervals, the static is discharged and allowed to rebuild. Correlation of the charge developed in this measurement with actual performance observed under various manufacturing and use conditions is generally very good provided the relative humidity is reasonably close to the test condition.

DETL:

Component %/wt.

(a) tridecyl stearate 45 (b) PEG 400 20
(c) K salt of aliphatic 10 monohydric alcohol phosphate (d) alcohol & acid
ethoxylates 20 and soap (e) water 5 100.0

CLPR:

1. A finish composition for fiber and textile materials comprising from about 5 to about 30 weight percent of an antistatic agent, from about 0 to about 80 weight percent of an emulsifier, from about 15 to about 50 weight percent of polyethylene glycol having a molecular weight in the range of about 200 to 1000, and the balance, a lubricant consisting of a mixture of 100 weight percent of

20. A process for treating a fiber or textile material with a finish composition, comprising contacting said fiber or textile material with a finish composition comprising from about 7 to about 20 weight percent of an antistatic agent, from about 0 to about 80 weight percent of an emulsifier, from about 15 to about 50 weight percent of a polyethylene glycol having a molecular weight of from about 200 to about 600, and the balance, a lubricant, all weights being based on the weight of said composition.

CLPR:

35. The process of claim 20 wherein said lubricant is selected from the group consisting of ethoxylated fatty acids with chain lengths ranging from about 9 to 18 carbon atoms, butyl stearate, tridecyl stearate, polyol esters and synthetic hydrocarbon oils.

DOCUMENT-IDENTIFIER: US 6123990 A

TITLE: Anti-static lubricant composition and method of making same

BSPR:

Antistatic agents have other advantages. For example, treatment of **polyester** and nylon fabrics with **antistatic** agents has been shown to reduce fabric soiling. Static-prone plastic articles, such as packaging materials, that are treated with **antistatic** agents resist accumulation of dust and thus are more attractive for packaging of consumer products. **Antistatic** agents are also used for enhancing the receptivity of plastic surfaces to electrostatically applied coatings, e.g., in automobile production.

BSPR:

Various chemicals have been proposed for use as **antistatic** agents, including, by way of example, long-chain amines, amides and quaternary ammonium salts; **esters** of fatty acids and their derivatives; sulfonic acids and alkyl aryl sulfonates; polyoxyethylene derivatives; polyglycols and their derivatives; polyhydric alcohols and their derivatives; and phosphoric acid derivatives.

BSPR:

In accordance with this invention, it has been found that water-dispersible or water-soluble polymers having hydrophobic and hydrophilic properties are eminently useful in processing synthetic **fibers of polyolefins such as polypropylene, polyesters** and polyamides such as nylon. It has been found that where polymers have hydrophobic and hydrophilic properties, the hydrophilic portion of the polymer imparts anti-static properties during processing of the fibers and the hydrophobic portion of the polymer imparts lubrication properties during processing of the fibers.

BSPR:

The alkoxylated fatty alcohol may be the reaction product of a C.sub.1 to C.sub.16 fatty alcohol with up to about 32 moles of ethylene oxide per mole of alcohol, or up to about 30 moles of ethylene oxide and up to about 25 moles of propylene oxide per mole of alcohol. As earlier indicated, the alkoxylated reaction product should have a terminal hydrocarbon chain length of at least one carbon atom, preferably from about 4 to about 10 carbon atoms. The alkoxylated reaction product is reacted with an alkali metal hydroxide such as sodium hydroxide or potassium hydroxide to form an alkali metal alkoxide derivative such as the sodium or potassium alkoxide derivative which is then condensed with an alkyl chloride. The alkyl chloride may be selected from a dialkyl or higher alkylchloride, diepoxide or higher epoxide, or an alkylchlorohydrin, and is preferably, epichlorohydrin. The condensation

polymers have been found to provide lubrication and anti-static properties to processed polymeric **fibers, particularly polypropylene**.

BSPR:

The **antistatic and lubricating** composition may be applied to natural or synthetic textile materials or mixtures of natural and synthetic materials, e.g., nylon, **polyesters**, polycarbonates, **polyolefins**, polyurethanes, rayon, acetate, rayon-cellulosic material such as cellulose acetate-propionate, cellulose-butyrate, cotton, linen, jute, ramie, wool, mohair and glass, e.g. fiberglass and fiberglass insulation. The textile materials may take virtually any form, including individual fibers, yarns, woven materials such as fabrics, cloth, carpets, rugs and upholstery and non-woven materials such as felts, batts and mats. In the case of fiberglass strand or fiberglass insulation, the composition may be applied externally as a finish or as part of a sizing composition.

BSPR:

The plastic substrates in which the **antistatic and lubricating** compositions of the invention may be beneficially incorporated include, for example, nylon (polyamide), polycarbonate, polyphenylene oxide, **polyester, polyolefins such as polypropylene**, and blends thereof with various other compatible resins.

BSPR:

Representative examples of suitable thermoplastic materials which may be treated with the **antistatic and lubricating** composition of the invention include polyester/polyether, nylon/polyester, polyurethane, and filled **polyester**.

BSPR:

Examples of thermoset materials which may be treated with the **antistatic and lubricating** composition of the invention include linear **polyethylene**, alkyl **polyester**, and epoxy resins.

BSPR:

Antistats function by either reducing the charge generation or by increasing the rate of charge dissipation. Most antistats operate by increasing the rate of dissipation and rely on atmospheric moisture for their effectiveness. A **fiber such as polypropylene** depends on an antistat coating to impart high surface conductivity for charge dissipation. There are several ways to assess the **antistatic** activity of a finish composition. During the measurement of fiber to metal friction and the passage of yarn around the metal pin, static charges are generated. The Rothschild friction meter has an electrostatic voltmeter attachment which measures the charge generated by the moving yarn. At periodic intervals, the static is discharged and allowed to rebuild. Correlation of the charge developed in this measurement with actual performance

observed under various manufacturing and use conditions is generally very good provided the relative humidity is reasonably close to the test condition.

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Time: 17:53

Document Listing

Document	Image pages	Text pages	Error pages
US 6008145 A	0	2	0
Total	0	2	0

DOCUMENT-IDENTIFIER: US 6008145 A

TITLE: Composition for the permanent hydrophilation of polyolefin fibres, use of the composition and fibres treated therewith

ABPL:

A composition for the permanent hydrophilation of **polyolefin fibers and filaments** and non-woven textile articles (non-wovens) produced therefrom, contains 15 to 75 parts by weight of at least one non-ionic surfactant, and 25 to 85 parts by weight of at least one quaternary ammonium compound and/or at least one cationically modified polydimethyl siloxane. The composition has excellent permanent hydrophilating properties, an excellent cohesion effect and good **antistatic** properties. When diluted with water, these compositions can therefore be used particularly satisfactorily as spinning preparations for the permanent hydrophilic finishing of **polyolefin fibers, polyolefin filaments** and non-wovens produced therefrom, in particular fleeces.

BSPR:

A process for hydrophilating polyolefin-fibre fleeces by applying an aqueous alkoxylated surfactant composition to the surface of the fibres is known from EP-B 1-0 410 485, in which the composition either consists up to at least 80% of alkoxylated triglycerides of C.sub.18 fatty acids, in which case the said triglycerides have a large proportion of alkoxylated ricinolein or of alkoxylated and hydrogenated ricinolein, or consists up to at least 80% of a mixture of alkoxylated or alkoxylated and hydrogenated ricinolein, a polyalkylene-modified water-soluble polydimethyl siloxane and an **antistatic** compound, in which case the said compound can be for example a neutralized phosphoric acid **ester**, an alkoxylated phosphate, a potassium salt, an ammonium salt or an alkoxylated ammonium salt.

BSPR:

The composition according to the invention has excellent permanent hydrophilating properties, an excellent cohesion effect and good **antistatic** properties. When diluted with water, these compositions can therefore be used particularly satisfactorily as spinning preparations for the permanent hydrophilic finishing of **polyolefin fibres, polyolefin filaments** and non-wovens produced therefrom, in particular fleeces.

DEPR:

10% by weight of ethoxylated ricinol (cohesion agent) and 10% by weight of fatty acid polyethylene glycol **ester** (emulsifier and **lubricant**).

DEPR:

8.5% by weight of ethoxylated ricinol (cohesion agent) and 8.5% by weight of

fatty acid polyethylene glycol ester (emulsifier and lubricant).

DEPR:

8% by weight of ethoxylated ricinol (cohesion agent) and 8% by weight of fatty acid polyethylene glycol ester (emulsifier and lubricant).

DEPR:

In this way, the compositions according to the invention provide the person skilled in the art with a further agent which is eminently suitable for the permanent hydrophilating finishing of polyolefin fibres and filaments as well as textile fabrics produced therefrom and which can be used to particular advantage for producing hydrophilic covering fleeces for babies' nappies and incontinence products. In addition, the compositions according to the invention result in a perceptibly improved cohesion of the non-wovens finished therewith and in improved antistatic properties; this in turn has the result that the textile article can be produced and treated at higher rates than hitherto.

DOCUMENT-IDENTIFIER: US 5981068 A

TITLE: Modified polyolefin fibers and a non-woven fabric using the same

BSPR:

The main component referred to herein means that it occupies 15% of the oiling agent. Further, the dibasic acid ester and the aliphatic acid ester can be adhered onto the polyolefin fibers, each alone or in mixed state. In addition, antistatic agent, emulsifying agent, etc. as components other than the dibasic acid ester and aliphatic acid ester may be blended, within a range of quantity not obstructing the effectiveness of the present invention. Among these agents, polyethylene glycol monoester or diester, Na alkylsulfonate, fatty acid amide, etc. are mentioned.

BSPR:

The percentage of the oiling agent adhered onto the polyolefin fibers in the present invention is within a range of 0.1 to 1.0% by weight, preferably 0.2 to 0.5% by weight. If the percentage of the oiling agent adhered is less than 0.1% by weight, the antistatic property at the carding process becomes inferior so that a formation unevenness occurs on the web; but it is impossible to make the line speed high in order to avoid the occurrence. If the quantity of the agent adhered is reduced, the penetration and adsorption of the agent into the surface part of the polyolefin fibers for promoting adhesion are insufficient so that it becomes difficult to form a skin layer having adsorbed the dibasic acid ester or aliphatic acid ester; hence improvement in the hot-melt-adhesion is obstructed.

DOCUMENT-IDENTIFIER: US 5972497 A
TITLE: Ester lubricants as hydrophobic fiber finishes

TTL:
Ester lubricants as hydrophobic fiber finishes

ABPL:
Finish compositions and methods for the manufacture of synthetic fibers and/or fabrics comprise hydrophobic esters of pentaerythritol homologs, such as hydrophobic pentaerythritol ester, as lubricants. These esters may be used by themselves or in conjunction with antistatic agents and/or other lubricants and permit the obtaining of high-strength nonwoven materials with increased production plant line speed and productivity. The finish may be used with a variety of fibers and fabrics.

BSPR:
Various materials are known for assisting the processing of fibers while rendering and/or maintaining the fiber hydrophobic. Schmalz, U.S. Pat. No. 4,938,832, and European Patent Application No. 486,158, incorporated by reference as if set forth in their entireties herein, describe fiber finish compositions containing at least one neutralized phosphoric acid ester having a lower alkyl group, such as a 1-8 carbon alkyl group, which functions as an antistat, in combination with polysiloxane lubricants. These fibers have excellent properties, particularly for manufacture of hydrophobic nonwoven fabrics for hygienic products such as diapers, adult incontinence and sanitary protection products.

BSPR:
Harrington, U.S. Pat. No. 5,540,953, incorporated by reference as if set forth in its entirety herein, describes antistatic compositions useful in the preparation of hydrophobic fibers and nonwoven fabrics. One finish described therein comprises 1) at least one neutralized C.sub.3 -C.sub.12 alkyl or alkenyl phosphate alkali metal or alkali earth metal salt, and 2) a solubilizer. A second finish described therein comprises at least one neutralized phosphoric ester salt.

BSPR:
In one aspect of the present invention, it is an object to provide an essentially hydrophobic fiber finish composition comprising at least one ester of pentaerythritol homolog comprising at least one hydrophobic ester of pentaerythritol homolog dimer, and at least one anti-static agent and/or at least one additional lubricating agent. The hydrophobic ester of

pentaerythritol dimer homolog may preferably comprise at least one di-pentaerythritol ester. More preferably, the ester of pentaerythritol homolog may comprise a mixture of mono-pentaerythritol ester and di-pentaerythritol ester. More preferably, the mono-pentaerythritol ester and di-pentaerythritol ester comprise substituents independently selected from the group consisting of hydrogen and C.sub.1 -C.sub.21 hydrocarbyl groups. Even more preferably, the mono-pentaerythritol ester and di-pentaerythritol ester comprise substituents independently selected from hydrogen and C.sub.1 -C.sub.21 alkyl groups, even more preferably, the substituents are independently selected from hydrogen and C.sub.1 -C.sub.14 alkyl groups, even more preferably, from C.sub.5 -C.sub.10 alkyl groups, even more preferably, from saturated C.sub.5 -C.sub.10 alkyl groups, and even more preferably, from normal saturated C.sub.5 -C.sub.10 alkyl groups.

BSPR:

The additional antistatic agent may comprise various antistatic agents, such as, neutralized phosphoric acid esters, hydrocarbyl phosphate esters, ethoxylated hydrocarbyl phosphate esters, partially hydrolyzed hydrocarbyl phosphate esters, and/or, antistatic agents which contain, in addition to an antistatic functional group, a reactive hydrogen group, as well as salts of any of these, where the hydrocarbyl groups may be independently selected from C.sub.1 -C.sub.20 alkyl groups, C.sub.3 -C.sub.20 cycloalkyl, C.sub.6 -C.sub.20 aryl groups, and combinations thereof.

BSPR:

In another aspect of the present invention, it is an object to provide an essentially hydrophobic polymer fiber which is preferably polyolefin fiber, even more preferably polypropylene fiber, preferably staple fiber, including a coating comprising at least one ester of pentaerythritol homolog comprising at least one hydrophobic ester of pentaerythritol homolog dimer. Preferably, the hydrophobic ester of pentaerythritol dimer homolog comprises at least one di-pentaerythritol ester. Even more preferably, the ester of pentaerythritol homolog comprises a mixture of mono-pentaerythritol ester and di-pentaerythritol ester. Optionally, the coating may comprise at least one antistatic agent and/or at least one lubricating agent. The coating can also contain any combination of components, such as various esters and their combinations, additional lubricating agents and antistatic agents as discussed herein with respect to the composition.

BSPR:

Again, it is pointed out that in each of the aspects of the invention including the compositions, fibers, processes and nonwovens, the finish composition and coating can contain any combination of components, including any combination of esters, additional lubricating agents and antistatic agents.

BSPR:

As a fiber finish, the lubricant may be applied topically, optionally with an antistat and/or other lubricants and/or other additives, to increase processability while retaining hydrophobicity of the fiber. Because esters tend to be hydrophilic, the ability of these esters to impart a high degree of hydrophobicity to polymer fibers is unexpected. Further, when nonwoven polyolefin-containing fabric is prepared from fibers or filaments prepared with these esters, the nonwoven fabrics surprisingly exhibit increased strength, such as cross-directional strength, when compared to nonwoven fabrics of the prior art.

BSPR:

In addition to being excellent fiber lubricants, PEOH esters are thermally stable due to the neopentyl structure in which labile beta-hydrogens are absent from the alcohol portion of the molecule. Moreover, the ester functionality of the pentaerythritol esters render them compatible with phosphate or other polar antistats, which helps to eliminate deposit problems such as discussed in Harrington, U.S. Pat. No. 5,540,953 and European Patent Application No. 557,024, which are incorporated by reference as if set forth in their entirety herein.

BSPR:

When a finish of the present invention is applied as an oil-in-water (o/w) emulsion, it may be prepared from a stock emulsion containing a high proportion of PEOH ester. The stock emulsion preferably includes one or more surfactants to improve the emulsifiability and/or stability of the emulsion. The stock emulsion may be prepared in any manner which one having ordinary skill in the art can readily ascertain. A partial illustrative list of suitable surfactants includes polysorbate 85 (available as Tween.RTM. 85, (ICI Surfactants, Wilmington, Del.), and PEG 400 monolaureate. The stock emulsion may be prepared, for example, in a laboratory or commercial emulsifier or homogenizer. When a surfactant is used, it may be present in an amount of about 10% or less by weight of the lubricant including the PEOH ester and other lubricants, if present, and preferably about 4% or less. The 15 active ingredients may comprise about 10-90% by weight of the stock emulsion, preferably about 20-80%, and more preferably about 35-65%, about 50% being especially preferred.

BSPR:

The lubricants of the present invention may optionally be used in conjunction with any fiber lubricants. Such additional lubricants may be selected, for example, from mineral oils, paraffinic waxes, polysiloxanes, polyglycols, derivatives of these, and others as described herein. An illustrative partial list from this group of additional lubricants includes polydimethylsiloxane, polyethylene glycols and mixed polyethylene-propylene glycols. Also included in this partial list are hydrophobic monoalkyl esters of mixed

polyethylene-propylene glycols, polyoxyethylene derivatives and others as taught by Johnson et al., U.S. Pat. No. 5,403,426. Also included are lubricants such as the paraffinic waxes described in WO 94/20664 and WO 95/19465, the disclosures of which are hereby incorporated by reference as if set forth in their entireties herein.

BSPR:

The lubricants of the present invention may optionally be used in conjunction with antistatic agents. Any of anionic, neutral, or cationic antistatic agents can be used, such as disclosed in Schmalz, U.S. Patent No. 4,938,832 and in Johnson et al., U.S. Pat. No. 5,403,426, which are incorporated by reference in their entireties. These include, for example, neutralized phosphoric acid esters represented by the formula ##STR7## in which Alk is independently defined as a lower alkyl group, inclusive of a 1-8 carbon alkyl such as methyl or octyl; R is independently defined as an amine salt or an alkali metal salt; and s and t are individually defined as positive numbers not less than 1, the sum of which is about 3.

BSPR:

Also satisfactory are the antistat compositions described in Harrington, U.S. Pat. No. 5,540,953, which is incorporated by reference in its entirety. Described therein are antistatic compositions comprising at least one neutralized C.sub.3 -C.sub.12 alkyl or alkenyl phosphate alkali metal or alkali earth metal salt and a solubilizer, or a neutralized phosphoric ester salt having the general formula (MO).sub.x --(PO)--(O(R.sub.1).sub.n R).sub.y wherein generally M is an alkali or alkali earth metal, R.sub.1 is a short-chain alkylene oxide, R is a long-chain alkyl or alkenyl group, n is 1 to 10, and x and y are natural numbers having the sum of three. The solubilizer may be chosen from among glycols, polyglycols, glycol ethers, and neutralized phosphoric ester salts.

BSPR:

Other phosphate-type antistatic agents include, but are not limited to, those of Wishman et al., U.S. Pat. No. 4,291,093, the disclosure of which is hereby incorporated in its entirety by reference. These antistats include hydrocarbyl phosphate esters, ethoxylated hydrocarbyl phosphate esters, partially hydrolyzed hydrocarbyl phosphate esters, or their salts. Wishman et al defined hydrocarbyl as a hydrocarbon radical selected from the C.sub.1 -C.sub.20 alkyl groups, C.sub.3 -C.sub.20 cycloalkyl, C.sub.6 -C.sub.20 aryl groups, and combinations thereof, such as alkylaryl groups.

BSPR:

The esters of the present invention are preferably applied simultaneously with optional material, used as the antistatic agents or additional lubricants, when such additional ingredients are used. If desired, however, other material

used, such as antistatic agents or additional lubricants, may instead, or also, be applied before or after the esters of the present invention are applied.

DEPR:

Other applications of this invention are also contemplated. For example, replacing the silicone lubricating finish of U.S. Pat. No. 4,938,832 or European Patent Application No. 486,158 with HERCOLUBE.RTM. synthetic esters results in improved productivity and improved cardability. Specifically, it permits the processing equipment to card the fiber at greater than 500 feet/minute, and to spin fibers at greater than 1300 meters/minute.

CLPR:

37. The fiber according to claim 36, wherein said at least one antistatic agent is selected from the group consisting of neutralized phosphoric acid esters and salts thereof.

ORPL:

Aqualon, Technical Information, Bulletin ORS-601B, Hercolube 202 Polyol Ester Base Stock for Automotive, Aircraft, and Industrial Lubricants, Aqualon Company, Wilmington, DE., undated.

ORPL:

Aqualon, Product Data, No. 4105, Hercolube Synthetic Esters for Lubricants Base Stocks, Hercules Incorporated, Aqualon Division, Wilmington, DE, 1993, pp. 1-3.

DOCUMENT-IDENTIFIER: US 5958806 A

TITLE: Cardable hydrophobic polyolefin fibres comprising cationic spin finishes

ABPR:

A method for producing cardable, hydrophobic **polyolefin**-based staple fibers by applying to spun filaments a first spin finish comprising at least one cationic **antistatic** agent, in particular a quaternary ammonium salt, stretching the filaments, applying to the stretched filaments a second spin finish in the form of a dispersion comprising at least one hydrophobic lubricant selected from a fatty acid amide condensation product and a hydrocarbon wax, the second spin finish optionally further comprising a polydiorganosiloxane in an amount of up to 15% by weight, and crimping, drying and cutting the filaments to obtain staple fibers; as well as textured, **cardable, polyolefin**-based staple fibers prepared by the method and hydrophobic nonwoven materials produced from such fibers. The fibers are able to be carded at extremely high speeds and are particularly suitable for use in the preparation of thermally bonded hydrophobic nonwoven fabrics in which a dry, water-repellant surface which can function as a liquid barrier is desired, e.g., for disposable diapers, feminine hygienic products and medical products.

BSPR:

The present invention relates to cardable and thermobondable **polyolefin**-based synthetic fibres treated with hydrophobic spin finishes comprising a cationic **antistatic** agent and a hydrophobic lubricant, a method for producing the fibres, and nonwoven products prepared from the fibres.

BSPR:

A number of **polyolefin**-based hydrophobic synthetic fibres are known, for example hydrophobic textile fibres with dirt and stain resistant properties. However, such fibres generally contain cationic **antistatic** agents that are undesirable or unsuitable for personal hygiene and medical products for toxicological reasons, since they often exhibit skin irritating properties due to their low pH. Also, some components may during use release di- or tri-ethanolamine, which is suspected of causing allergic reactions. It has previously proved difficult to produce fibres for hygienic or medical use having good cardability properties together with satisfactory hydrophobic properties. This is particularly important for the many applications in which it is desired that hydrophobic fibres may be carded using high carding speeds.

BSPR:

EP 0 557 024 A1 describes **polyolefin fibres** treated with an **antistatic** agent which is a neutralized phosphate salt, and optionally with a hydrophobic lubricant selected from mineral oils, paraffinic waxes, polyglycols and

silicones, the fibres having an hydrostatic head value of at least 102 mm. WO 94/20664 describes a method for producing cardable, hydrophobic polyolefin-based staple fibres using two spin finishes, in which the second spin finish is a dispersion comprising an antistatic agent, preferably an anionic or non-ionic antistatic agent, and, as a hydrophobic agent, a natural or synthetic hydrocarbon wax or wax mixture, and optionally a silicone compound.

BSPR:

The present invention represents a different and highly effective approach to the problem of providing polyolefin staple fibres with an optimum combination of hydrophobic and antistatic properties, thereby making them suitable for the production, in particular by means of high-speed carding, of nonwovens with optimum strength and hydrophobic characteristics. Furthermore, the invention is based on the use of substances which are not irritating to the skin.

BSPR:

Antistatic agents of the quaternary ammonium salt type are commonly used for polyolefin fibres outside the hygienic sector, in particular for bulk continuous filaments or staple fibres intended for use in e.g. carpets or technical applications, rather than for hygienic applications or clothing. According to the present invention it has been found that fatty acid amide condensates and natural or synthetic hydrocarbon waxes can be advantageously used in combination with cationic antistatic agents, the fatty acid amide condensates and waxes functioning as hydrophobic lubricants, i.e. providing hydrophobic properties as well as the desired frictional properties.

BSPR:

Certain types of prior art polypropylene fibres are produced using cationic antistatic agents, esterified wax components and a large amount of alkoxylated emulsifiers. However, the spin finishes of such fibres typically contain a relatively large amount of acetic acid or another acid that must be evaporated during bonding to avoid acid-induced skin irritation. In contrast, the fibres of the present invention are prepared using non-alkoxylated emulsifiers without esterified wax components, and also without the use of large amounts of an acid.

BSPR:

Antistatic agents are a necessary component for all spin finishes used in the production of polyolefin fibres. Such antistatic agents are by nature polar and therefore also more or less hydrophilic, which in principle is a necessary evil one must live with in the case of spin finishes that are otherwise hydrophobic. In such cases, the amount of antistatic agent is reduced to a minimum in order to preserve the hydrophobic nature of the spin finish. One way of achieving this is by using a highly effective antistatic agent, of which

only a small amount is necessary to obtain the desired antistatic effect. However, commonly employed anionic antistatic agents such as phosphoric acid esters are not particularly effective, since they for hydrophobic fibres often contain long alkyl chains, whereby the concentration of phosphor groups is relatively low. Since the relative number of these phosphor groups determines the antistatic properties, it follows that such agents are relatively ineffective. The following typical values for normal antistatic components serve as a guideline for the relative efficiency of their antistatic properties: inorganic salts 100, cationic 80-100, anionic 75-90, nonionic 50-70, fixing agents 30, mineral oils and silicones 0-10, lubricants 30-50.

BSPR:

The cationic antistatic agents used according to the invention have a particular advantage that is related to the fact that polyolefins, and particularly polypropylene during processing by long spin techniques, become partially oxidized on the surface. Thus, while polyolefins are known to be hydrophobic, they can in certain cases have surface properties that are not strictly hydrophobic. As a result of this partial oxidation, some hydroxy and carboxy groups as well as aldehyde and ketone groups are introduced on the surface. In addition to being polar and thus hydrophilic, such polymer bound groups are also anionic. This means that they will in principle repel any aqueous solution of anionic antistatic agent that one attempts to apply to the fibres. This leads to a non-uniform, less efficient coating of the antistatic agent on the fibre surface, and thus poorer antistatic properties, as well as the risk that agglomerations of antistatic agent will be deposited on the equipment during carding. Also, there is a risk of having regions on the surface that are relatively hydrophilic and other regions that are hydrophobic. The presence of such hydrophilic regions would tend to conduct liquids through a nonwoven, thus diminishing the hydrophobic properties. In the case of cationic (positively charged) antistatic agents, however, the oppositely (i.e. negative) charged groups on the polymer surface will ensure a uniform distribution of the antistatic agent on the fibre surface.

BSPR:

The cationic antistatic agents used according to the present invention are typically quaternary ammonium salts. Such cationic antistatic agents may be included in the polyolefin as e.g. alkyl alkanol amines, alkoxylated allylene diamines, or the hydroxyethyl-dodecyl-oxypropylamine salt of hydroxy-propionic acid, or as quaternary ammonium salts such as stearyl polyether acetal ammonium salt. (Ahmed, Polypropylene Fibres--Science and Technology, Elsevier Scientific Publishing Co., 1982, p. 375). Fatty acid amine condensates provide good antistatic behaviour and also high friction under wet conditions, which aids in the obtainment of good texturization in a stuffer box crimper.

BSPR:

The cationic antistatic agents of the invention are therefore preferably selected from compounds with fatty acid amide end groups, tertiary long chain amine end groups or ester groups, in particular compounds of the general formula I ##STR1## wherein Z.sup.1 and Z.sup.2 are Alk--CONH--, (Alk).sub.2--N--, Alk--COO--, or H, wherein Alk is a linear aliphatic alkyl or alkenyl group containing 10-24 carbon atoms or a mixture of more than one such group, with the proviso that both Z.sup.1 and Z.sup.2 cannot be H; R.sup.1 is H, CH.sub.3, alkyl with up to 24 carbon atoms, or a dimethylene fatty acid ester; R.sup.2 is H or CH.sub.3; n is an integer greater than 0; m is an integer greater than 0; and X.sup.- is a counterion. With the exception of the above proviso, i.e. that Z.sup.1 and Z.sup.2 cannot both be H, Z.sup.1 and Z.sup.2 may be the same or different, and are preferably the same.

BSPR:

The emulsifier should for obvious reasons not be particularly hydrophilic, and it is clear that it must be compatible in terms of electric charge with the chosen antistatic agent(s) and hydrophobic lubricants(s). Suitable emulsifiers are for example fatty acid alkyl esters, fatty acid alkyl amides, alkyl ethers and ethoxylated long chain alcohols (fatty alcohols). More generally, preferred emulsifier compounds contain a cationic group with one or two (preferably two) fatty acid chains, e.g. with 8-22 carbon atoms, typically 12-20 carbon atoms, more typically 16-18 carbon atoms. These may be saturated or unsaturated, although saturated fatty acid chains are preferred. Commercially available products are often mixtures containing emulsifier compounds with fatty acid chains of different lengths, as in coconut oil, palm oil, etc.

DEPR:

The polyolefin raw material (polypropylene) was spun into fibres by conventional spinning (long spinning) technology, using spinning speeds of 1500-2000 m/min, resulting in a bundle of several hundred filaments. After quenching of the filaments by air cooling, the filaments were treated by means of a lick roller with a first spin finish containing the antistatic agents mentioned below.

DEPR:

In comparative Examples 1 and 3 the antistatic agent was anionic and consisted of a neutralized C.sub.16 -C.sub.18 alcohol phosphoric acid ester, the major part of which was a neutralized stearyl alcohol phosphoric acid ester (Silastol F203, Schill & Seilacher GmbH, Germany).

DEPR:

A silicone-free fibre prepared using spin finishes with anionic antistatic agents (a neutralized C.sub.16 -C.sub.18 alcohol phosphoric acid ester, the major part of which was a neutralized stearyl alcohol phosphoric acid ester).

Web cohesion length 1.75 m.

CLPR:

4. A method according to claim 1 wherein the cationic **antistatic** agent is a quaternary ammonium salt selected from compounds of the general formula I ##STR6## wherein Z.sup.1 and Z.sup.2 are Alk--CONH--, (Alk).sub.2 --N--, Alk--COO--, or H, wherein Alk is a linear aliphatic alkyl or alkenyl group containing 10-24 carbon atoms or a mixture of more than one such group, with the proviso that both Z.sup.1 and Z.sup.2 cannot be H; R.sup.1 is H, CH.sub.3, alkyl with up to 24 carbon atoms, or a dimethylene fatty acid **ester**; R.sup.2 is H or CH.sub.3; n is an integer greater than 0; m is an integer greater than 0; and X.sup.- is a counterion;

CLPR:

24. A texturized, cardable, staple **fibre of a polyolefin** or a copolymer thereof carrying, at its surface, a spin finish coating comprising at least one cationic **antistatic** agent and at least one hydrophobic lubricant selected from i) a fatty acid amide condensation product based on mono- and/or diamines and fatty acid chains containing 10-24 carbon atoms and ii) a hydrocarbon wax, the fibre being texturized to a level of about 5-15 crimps/cm such that it is able to be carded continuously at a speed of 150 m/min. to a nonwoven material showing at least one of the following characteristics:

CLPR:

25. A texturized, cardable, stable **fibre of a polyolefin** or a copolymer thereof carrying, at its surface, a spin finish coating comprising at least one cationic **antistatic** agent and at least one hydrophobic lubricant selected from i) a fatty acid amide condensation product based on mono- and/or diamines and fatty acid chains containing 10-24 carbon atoms and ii) a hydrocarbon wax, the fibre having a liquid absorbency time of at least about 1 hour, as determined according to the EDANA recommended test for nonwovens absorption (No. 10.1-72) on samples taken from a carding web with a base weight of approximately 10 g/m.sup.2 prepared by carding at 15 m/min, the samples having been conditioned at a temperature of 45.degree. C. and at a relative humidity of less than 10% for one hour prior to testing and allowed to cool to 23.degree. C. before testing.

CLPR:

26. A texturized, **cardable, fibre of a polyolefin** or a copolymer thereof carrying, at its surface, a spin finish coating comprising at least one cationic **antistatic** agent and at least one hydrophobic lubricant selected from i) a fatty acid amide condensation product based on mono- and/or diamines and fatty acid chains containing 10-24 carbon atoms and ii) a hydrocarbon wax, the fibre having a web cohesion of at least 1.75 m, as determined by a web cohesion test carried out by measuring the length a carding web of 10 g/m.sup.2 can

support in a substantially horizontal position before it breaks due to its own weight, the length of the carding web being increased at a rate of 15 m/min.

DOCUMENT-IDENTIFIER: US 5807973 A

TITLE: Melt-stable lactide polymer nonwoven fabric and process for manufacture thereof

DEPR:

Nonionic antistatic agents are uncharged surface-active molecules of a significantly lower polarity than the above mentioned ionic compounds and include polyethylene glycol esters or ethers, fatty acid esters or ethanolamides, mono- or diglycerides or ethoxylated fatty amines. The above surfactants may also act as antistatic agents, which may be desirable.

DOCUMENT-IDENTIFIER: US 5525706 A

TITLE: Melt-stable lactide polymer nonwoven fabric and process for manufacture thereof

DEPR:

Nonionic antistatic agents are uncharged surface-active molecules of a significantly lower polarity than the above mentioned ionic compounds and include polyethylene glycol esters or ethers, fatty acid esters or ethanolamides, mono-or diglycerides or ethoxylated fatty amines. The above surfactants may also act as antistatic agents, which may be desirable.

DOCUMENT-IDENTIFIER: US 5372739 A

TITLE: Lubricant-impregnated fibers, lubricant, and processes for preparation thereof

ABPL:

Fibers such as caustic-treated non-round polyester fibers are prepared having certain lubricants strongly adhered to the surfaces thereof. These fibers are prepared by contacting the fibers, such as immediately prior to a crimping device, with a suitable heated hydrophilic lubricant in a processing operation followed by heating to dry or bake the lubricant onto and/or into the surface of the fibers.

BSPR:

Another aspect of this invention entails novel fiber processing lubricants comprising a mixture of high and low molecular weight polyethylene glycol fatty acid esters preferably in combination with a minor amount of a suitable antistatic agent. In some applications, this novel lubricant or mixture can be applied to the fibers of choice at about room temperature by various means as a less preferred option.

BSPR:

Yet another aspect of this invention entails a novel hydrophilic processing lubricant for use with fibers, particularly binder fibers, comprising a mixture of a suitable antistatic agent and at least one polyethylene glycol monolaurate or monostearate having a sorbitan group such as polyethylene glycol 880 sorbitan monolaurate and/or polyethylene glycol 880 sorbitan monostearate.

DEPR:

Antistatic agents useful in the present invention include quaternary amine salts, salts of polyoxyethylene inorganic fatty alcohol esters, ethosulfate salts of quaternary ammonium compounds, acid salts of quaternary ammonium compounds, etc. The preferred antistatic agents are the salts of quaternary ammonium compounds including the ethosulfate salts and acid salts such as the acetates, lactates, and propionates with the ethosulfate salts being more preferred. The most preferred ethosulfate salt of a quaternary ammonium compound is 4-ethyl, 4-cetyl, morpholinium ethosulfate.

DEPR:

The processing lubricant of the present invention is preferably at least partially water soluble and is not too viscous when in solution with water under the conditions when applied to the fibers. The lubricant of the present invention can contain a major portion of a polyoxyethylene fatty acid ester such as a methyl-capped polyoxyethylene laurate; a polyethylene glycol fatty

acid ester such as a polyethylene glycol laurate; or a fatty acid glyceride such as a glyceryl oleate. The processing lubricant of the present invention can also contain an amount of a compatible surfactant and/or softening agent. By compatible it is meant that this component would not cause an adverse reaction such as gelling, coagulation, precipitation, etc.

DEPR:

The processing lubricant is preferably selected from (A) a mixture of a major amount of a methyl-capped polyoxyethylene (x) fatty ester (x represents about 2 to 50 moles of ethylene oxide and the fatty ester contains 7 to 18 carbon atoms such as laurate), and a minor portion of quaternary amine carbonate or other suitable antistatic agent; and (B) a mixture of a major portion of at least one polyethylene glycol mono or dilaurate (molecular weight between about 80 and 2,000 with 400-600 being more preferred) and, if needed, a minor amount of a suitable antistatic agent with the mixture (B) being the most preferred processing lubricant.

DEPR:

According to another aspect of the present invention, an improved lubricant mixture is provided that generally falls within (B) above containing low and high molecular weight polyethylene glycol fatty acid esters such as polyethylene glycol 400 monolaurate and polyethylene glycol 600 monolaurate plus a minor amount of a suitable antistatic agent, such as 4-ethyl, 4-cetyl, morpholinium ethosulfate. By definition, a low molecular weight polyethylene glycol fatty acid ester has a molecular weight in the polyethylene glycol portion below 500. By definition, a high molecular weight polyethylene glycol fatty acid ester has a molecular weight in the polyethylene glycol portion above 500. The most preferred low molecular weight polyethylene glycol fatty acid ester is polyethylene glycol 400 monolaurate and the most preferred high molecular weight polyethylene glycol fatty acid ester is polyethylene glycol 600 monolaurate. This novel lubricant mixture is much preferred for use in the present invention and preferably comprises a major portion of substantially equal portions of the low molecular weight polyethylene glycol fatty acid ester and the high molecular weight polyethylene glycol fatty acid ester and a minor amount of a suitable antistatic agent, such as 4-ethyl, 4-cetyl, morpholinium ethosulfate. These components can be obtained from Henkel Corporation or ICI Americas Corporation.

DEPR:

The novel lubricant mixture most preferably contains at least about 40 weight percent of the low molecular weight polyethylene glycol fatty acid ester, at least about 40 weight percent of the high molecular weight polyethylene glycol fatty acid ester and about 20 to 1 weight % of a suitable antistatic agent with 4-ethyl, 4-cetyl, morpholinium ethosulfate being the preferred antistatic agent.

DEPR:

The fiber is contacted with a continuous flow or semicontinuous pulsed flow of the solution of processing **lubricant** at an elevated temperature, preferably at a temperature of at least about 40.degree. C. up to the boiling point of the solution. This temperature is more preferably between about 50.degree. and 100.degree. C. with a temperature less than about 95.degree. C. being most preferred. For drawn **polyesters** this most preferred temperature is between about 70.degree. and 95.degree. C. For binder fibers, such as copolyesters and undrawn **polyesters**, the preferred temperature is between about 40.degree. and 70.degree. C.

DEPR:

According to the process of the present invention, the fibers containing the coating of heated processing **lubricant** must be treated to a drying step such as heating in the tow dryer. This tow dryer should be equipped with an air circulation system. This completes the attachment of the processing **lubricant** securely to the surface of the fibers, particularly to the surface in the grooves of non-round fibers and more particularly caustic-treated grooves. The overall heating or drying time is preferably less than about 7 minutes and more preferably less than about 4 minutes. This drying step is preferably conducted at a temperature of at least about 40.degree. C. more preferably between 50.degree. C. and 135.degree. C. for at least about 20 seconds; even more preferably between 50.degree. C. and 115.degree. C. for at least 90 seconds with at least 180 seconds being most preferred. For acetate fibers and drawn **polyester** fibers this more preferred temperature is between about 60.degree. C. and 115.degree. C. For binder fibers such as copolyesters and undrawn **polyesters** this temperature is between about 40.degree. C. and 70.degree. C. However, it is understood that changes in drying temperature may be required in order to meet different end uses. When caustic is not used or when appropriate for a particular product, the heat-set cabinet can be operated at or near room temperature, if desired, with essentially all of the tow drying treatment being accomplished in the tow dryer.

DEPR:

A most preferred process of the present invention entails (1) subjecting a tow of caustic-treated and subsequently-neutralized **polyester** fibers as described to a heating device, most preferably rotating heated drums with tow-temperature controls and/or moisture sensors following an at least partial removal of water after the neutralization step and an optional application of at least one **lubricant** and/or additive; (2) forwarding the dried tow from the heating device at a tension suitable for proper crimping; (3) applying at least one heated processing **lubricant** to the dried tow; (4) crimping the fibers or applying rotating compression rolls to the fibers (preferably immediately after applying **lubricant**); and (5) heating the tow at a temperature for a time sufficient to

bake or dry the lubricant onto and/or into the surface of the fibers.

DEPR:

The determination of an approximate weight % lubricant on a fiber for mineral-oil-based lubricants is made by the infrared test method via analysis of the extract washed from a sample of fiber. Infrared absorption as described by Beer's Law is used to determine the mass of lubricant extracted into a suitable solvent, such as Freon (DuPont Corp.). The analyzer system dispenses solvent which washes the fiber to remove lubricant using a recirculating flow loop. The solution of Freon and lubricant is analyzed for total C-H bonds as it passes through an infrared absorption analyzer flow cell, such as a Wilks-Miran IR analyzer. The resultant signal is converted electronically to be displayed as the % lubricant (by weight). Conversion factors can be used to enable a single IR lubricant-test instrument to be used for analysis of several different lubricants which have been applied to various types of fibers. For example, a single testing station could be employed 1) to analyze polyester fibers which have been lubricated appropriately for sewing thread, and 2) to subsequently analyze polyester fibers which received lubricant which is suitable for use in certain nonwoven products. An IR lubricant-test instrument (the "Rothermel Finish Analyzer") can be purchased from Lawson-Hemphill Corp. of Spartanburg, S.C., U.S.A.

DEPR:

Relatively undrawn polyester binder fibers and amorphous copolyester binder fibers, etc. can be rendered suitably hydrophilic by the application of at least 0.2% and most preferably at least 0.3 wt. % of the described heated processing lubricants by the process of the present invention. Binder fiber can be blended with at least one other fiber or other material, such as wood pulp, and the blend is then heated to cause the binder fiber to bond with the other component, usually in a compressed state, to make bonded non-woven hydrophilic products with various characteristics. A preferred copolyester binder fiber of about 2 to 8 denier/filament with a 1.5 or 2 inch (about 4 cm) staple length can be prepared from 100 mole % terephthalic acid, 69 mole % ethylene glycol and 31 mole % 1,4-cyclohexanedimethanol. However, other binder fibers, including bicomponent types, can be used. Examples of suitable binder fibers include "KODEL 44U" (undrawn polyester) and "KODEL 410" (copolyester) fibers made by Eastman Chemical Company and "CELBOND" sheath-core, proprietary bicomponent fiber made by Hoechst Celanese Corp. The binder fibers can include side-by-side bicomponent types and those made from polyolefins.

DEPR:

Two samples of this polyester fiber ("FIG. 8" cross-section) were prepared as drawn crimped staple with about 1.5 denier per filament and 1.5-inch (3.8 cm) staple length using the process essentially as shown in FIG. 1 except without the application of the hot lubricant by the jet prior to the crimper.

Approximately 0.15 weight % and 0.3 weight % lubricant was applied at room temperature by a spray method to the tow after the tow dryer.

DEPR:

Caustic-treated fiber similar to that made for Sample A in Example 2 (except as stated below) was prepared using two hot-lubricant jets operated at about 80.degree. C. located above the tow as shown in FIG. 4. The crimped tow was dried in the tow dryer at 65.degree. C. for about 5 minutes. This example compares the fiber opening, carding performance, cohesion values and vertical-wicking performance of four hydrophilic lubricants applied by hot-lubricant jets to 1.5 denier per filament, 1.5 inch, polyester fiber in a "FIG. 8" cross-section. The fiber for all four lubricants was produced on the same line in an effort to hold processing variability to a minimum. The desired minimum weight % lubricant was at least 0.3. The crimp frequency was approximately 14 to 16 crimps/inch. The approximate mean crimp angle of about 70 degrees was obtained using the estimation method described in Example 9. However, as previously stated, crimp frequency and angle are useful rough estimates to have in setting up the operation of a processing line but are not sufficiently reproducible for acceptance sampling and do not provide an adequate indication of carding performance.

DEPR:

Overall, no advantage was found for Sample D over Sample B. The tests and observations were made by experienced carding operators who have made many such tests on various types of polyester fibers over a number of years. Thus, the results show that the lubricant formulation of Sample A provided good fiber opening but poor cohesion while the formulation for Sample C did not provide satisfactory fiber opening but did provide good cohesion. The results further indicate that when combined as was done for Sample B, the components provided good overall performance as shown above. In addition, the results indicate that the proportions of the components of the lubricant used for Sample B could be varied to a certain extent to provide increased or decreased responses for different fibers and to satisfy different final objectives.

DEPR:

The purpose of this example is to illustrate the use of the present invention on fibers other than polyester. Using the well known solvent-spinning process (acetone), cellulose acetate fibers of 3.3 denier per filament in a "Y-shaped" cross-section were spun from multiple cabinets and then were guided across a lubricating roll and into a crimper to form a 50,000 total denier crimped tow. This tow was then introduced under suitable low tension to the first set of rolls of the process shown in FIG. 1. The tow was passed through a draw bath at about 60 degrees C. using a draw ratio of about 1.2 to 1. A portion of this drawing step was used to remove the original crimp to create a tow with little or no crimp for this experiment. The bath was equipped with Liquid-Removal

Means 1 on the output side and the tow subsequently passed through a steam chest and the heat-setting unit both of which were maintained at about 100 degrees C. The bath and liquid-removal means were also used to remove at least the most easily accessible portion of the spinning lubricant (mineral-oil based).

DEPR:

No problems were found in using the novel three-jet lubrication apparatus and method in this test. Excessive flow was provided to the bottom jet with a return of excess lubricant to the lubricant heating and supply tank. Since three jets were not required to apply the target lubricant level to this about 55,000 to 60,000 denier tow, the bottom jet was removed to continue the experimental work using the top two jets. The fiber was "FIG. 8" polyester of about 1.5 denier per filament by about 1.5-inch staple length. We concluded that the novel three-jet design shown in FIG. 4 would be of major benefit in applying heated lubricant to the large tows of at least about 800,000 total denier up to several million total denier which are typical of full-scale production lines for polyester and other fibers.

DEPR:

This example is a further illustration of the overall performance of the three-component lubricant-antistat composition used in Sample B in Example 5. An "8-groove" polyester fiber drafted to about 5.9 denier per filament and crimped following application by jet of about 0.6 to 0.9 wt. % of this novel lubricant heated to about 80.degree.-85.degree. C. The analyses of the wt. % lubricant on the fiber were 0.58 and 0.94 and represent two different tests conducted when the fiber was being run and then later sampled from storage. These results are further examples of variability that we have found at times in repeat tests and also between laboratories, etc.

CLPR:

1. A processing lubricant composition comprising a mixture of high and low molecular weight polyethylene glycol fatty acid esters containing a polyethylene glycol fatty acid ester that has a molecular weight in the polyethylene glycol portion above 500 and a polyethylene glycol fatty acid that has a molecular weight in the polyethylene glycol portion below 500.

CLPR:

8. A processing lubricant composition comprising a mixture of about 1 to 20 weight percent of an antistatic agent and at least one polyethylene glycol monolaurate or monostearate having a sorbitan group.

CLPR:

10. The composition according to claim 2 wherein said antistatic agent is selected from the group consisting of quaternary amines salts, salts of

polyoxyethylene and organic fatty alcohol esters, ethosulfate salts of quaternary ammonium compounds and acid salts of quaternary ammonium compounds.

DOCUMENT-IDENTIFIER: US 5244724 A

TITLE: Self-bonded fibrous nonwoven webs having improved softness

BSPR:

Japanese Patent No. 60-058444 discloses polyolefin compositions having 0.05 to 1.0 parts by weight of alkyl amines and/or alkylamides and 0.1 to 2.0 parts by weight of glycerine monoesters such as glycerine monostearate and linolic acid monoglyceride wherein such compositions have excellent antistatic properties and which, even when heat molded, high speed injection molded or oriented, do not lose the antistatic effect.

BSPR:

Czechoslovakian Patent No. 8601268 discloses glycerol monostearate as an antistatic agent for polyolefins such as polypropylene fibers.

BSPR:

U.S. Pat. No. 5,071,699 discloses antistatic flexible fabric material formed from woven, axially oriented polypropylene yarn wherein the fabric has a coating on one or both sides of the fabric of a flexible thermoplastic polymer containing about 0.2 to 8 wt% of a polyol ester of a C.sub.10 to C.sub.28 fatty acid. The polypropylene yarn used to form the fabric may optionally also contain a lesser amount of the polyol ester of a C.sub.10 to C.sub.28 fatty acid.

BSPR:

When present on thermoplastic self-bonded nonwoven webs, static electricity can create undesirable effects such as dust pickup, interference during processing of such webs, static cling, sparking, and the like. In view of these undesirable effects, there is a need for uniform basis weight self-bonded, fibrous nonwoven webs having improved antistatic properties and whereby these nonwoven webs and composites comprising such webs have a reduced clinging effect and elimination of spark discharge and are less attractive to dust and lint. It is also desirable that for applications having human skin contact the self-bonded webs prepared from polypropylene-based thermoplastic resins have improved softness. Likewise, it is desirable especially in composite applications that such polypropylene-based webs which have antistatic agents present retain their as-formed water resistance properties as measured by hydrostatic resistance and water impact penetration.

BSPR:

Another object of this invention is to provide a uniform basis weight self-bonded, fibrous nonwoven web having improved antistatic and softness properties comprising a plurality of substantially continuous polymeric

DOCUMENT-IDENTIFIER: US 3652419 A
TITLE: ANTISTATIC FIBER LUBRICANT

ABPL:

An emulsifiable antistatic fiber lubricant composition, which exhibits excellent long term emulsion stability, comprising a mixture of a mineral oil, a methyl ester of a long chain fatty acid, a neutralized phosphoric acid ester of an ethoxylated alkyl phenol or alkyl alcohol, a polyoxyethylene sorbitan tristearate and fatty alkanolamide.

BSPR:

Compositions applied to textile fibers must also have antistatic properties. The problem of preventing the accumulation of static charges on textiles has troubled the industry for a number of years. This property of retaining static electrical charges is most often encountered in the processing of synthetic fibers such as are manufactured from polyesters and polyamides, polyvinyl chloride, polyvinyl acetate and other vinyl polymerization products as well as polymers of acrylic acid derivatives.

DEPR:

The phosphoric acid ester may be neutralized with an alkali (e.g. hydroxide of an alkali metal such as sodium, potassium, lithium or ammonium) in situ during the preparation of the lubricant composition or it may be added in the neutralized form. Preferably, potassium hydroxide is used as the neutralizing agent because of its better solubility, and it is conveniently added as a 45 percent solution. The exact quantity of base added, of course, is dependent upon stoichiometric considerations. Generally, a slight excess over the stoichiometric amount is used since the desired pH range of the ultimate emulsion composition is in the range of 7.5-8.5. This final pH has been found particularly suitable because of emulsion stability demands and, also, to prevent or inhibit corrosion when the composition is contacted with textile fibers and machinery.

DEPR:

These data demonstrate the advantageous antistatic properties of the compositions of the present invention. The tests were conducted by the resistivity method using Rothschild equipment. The value recorded as an indication of the discharge rate is the half-life of a 100 electrostatic volt charge applied through 20 strands of fiber. The Nylon and Dacron control fibers had been treated so as to remove the manufacturer's finish, while the polypropylene fiber contained this original finish.

DEPR:

It may be noted that it is known in the art to produce antistatic textile assistants utilizing various phosphate esters such as are disclosed, for example, in U.S. Pat. Nos. 2,730,498; 2,842,462; 3,170,877 and 3,056,744. Neither in these patents nor elsewhere, so far as we are aware, however, is there any disclosure or suggestion of the compositions which we have evolved which we have found to possess highly advantageous properties and which are quite low in cost.

DOCUMENT-IDENTIFIER: US 6117546 A

TITLE: Yarns containing linear low density polyethylene fibers

BSPR:

The linear low density polyethylene fibers can be crimped or uncrimped continuous filaments; crimped or uncrimped cut fibers, i.e., staple fibers, with lengths of about 3 to 150 millimeters, preferably about 5-150 mm, and most preferably about 25-50 mm, or discrete microfibers, i.e., melt-blown fibers. The linear low density polyethylene fibers preferably have a denier of about 1-30, more preferably about 2-15, and most preferably about 2-6. In this specification the term "fibers" is meant to include all of the types of fibers and filaments described above. The fibers can contain up to about 20% by weight of other materials such as, for example, stabilizers, pigments, additives and polymers other than linear low density polyethylene. The fibers can have a nominal amount, for example, up to about 2% by weight, of a surface finish, which can be either hydrophilic or hydrophobic. Suitable finishes include, for example, phosphate ester antistatic finishes, ethoxylated fatty acid esters, and polydimethyl siloxanes. Such finishes are described, for example in U.S. Pat. No. 4,938,832 and published European patent applications 486158, 557024, and 516412, the disclosures of which are incorporated by reference.

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Document Listing

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US 5972497 A	0	1	0
Total	0	1	0

DOCUMENT-IDENTIFIER: US 5972497 A

TITLE: Ester lubricants as hydrophobic fiber finishes

BSPR:

In another aspect of the present invention, it is an object to provide an essentially hydrophobic polymer **fiber which is preferably polyolefin fiber,** even more preferably **polypropylene fiber,** preferably staple fiber, including a coating comprising at least one **ester** of pentaerythritol homolog comprising at least one **hydrophobic ester** of pentaerythritol homolog dimer. Preferably, the **hydrophobic ester** of pentaerythritol dimer homolog comprises at least one di-pentaerythritol **ester**. Even more preferably, the **ester** of pentaerythritol homolog comprises a mixture of mono-pentaerythritol **ester** and di-pentaerythritol **ester**. Optionally, the coating may comprise at least one **antistatic** agent and/or at least one lubricating agent. The coating can also contain any combination of components, such as various **esters** and their combinations, additional lubricating agents and **antistatic** agents as discussed herein with respect to the composition.